

Spotlight

Los Alamos
in the news



Kevin N. Roark

A silicon wafer is loaded into a small pressure chamber for SCORR processing.

SCORR Wins Presidential Award

A Los Alamos research team is the co-recipient of the top small-business award in the 2002 Presidential Green Chemistry Challenge for its development of SCORR (Supercritical CO₂ Resist Removal). Sponsored by the U.S. Environmental Protection Agency, the award recognizes innovative ways to reduce pollution at its sources. SCORR was cited as a cost-effective, environmentally friendly process that is considered an enabling technology for the semiconductor industry to meet future design goals.

Creating silicon chips is a multistep process in which resist, a polymer film, is used to define circuit patterns through a technique called photolithography. As the circuits are fabricated by etching, excess resist must be removed before the next processing step. SCORR uses carbon dioxide in its supercritical state (possessing the solubility of a liquid and diffusion properties of a gas) as the primary cleaning solvent. Mixed with an environmentally friendly co-solvent, the fluid can penetrate and clean even submicrometer-sized chip features. Returning the carbon dioxide to its gas phase leaves the wafer dry and virtually free of residue; the gas itself can be recycled.

The current industrial process requires hazardous chemicals and as much as six million gallons of water a day at a typical fabrication plant. Environmental and worker safety advocates have criticized both the dangerous solvents and volume of water used. SCORR eliminates these requirements. In addition, as chip features shrink to smaller than 0.13 micrometer, water will not be able to penetrate them because of its relatively high surface tension. The zero surface tension of a supercritical fluid avoids this problem; SCORR thus offers a “green chemistry” approach to cleaning future microchips.

Patented by the Laboratory, the technology is licensed to SC Fluids of Nashua, NH, which is beginning to market it commercially. Los Alamos developers of SCORR are Craig Taylor, Kirk Hollis, Jerry Barton, Leisa Davenhall, Gunilla Jacobson, and Laurie Williams of the Applied Chemical Technology Group and Jim Rubin of the Nuclear Materials Science Group. —*Bill Dupuy*

Metropolis Center Dedicated

The Lab formally dedicated the Nicholas C. Metropolis Center for Modeling and Simulation in late May. The center’s two-year construction project ended more than

\$13 million under budget and several months ahead of schedule. The center was built to house one of the world's most powerful computers, referred to as the Q.

"This building and the Q supercomputer are essential elements in the National Nuclear Security Administration's Advanced Simulation and Computing program in support of stockpile stewardship," said Laboratory Director John Browne. "This project also demonstrates our commitment to renewing the Lab's infrastructure and ensuring we have the facilities and personnel to fulfill our national security mission. I'm extremely proud of how well our team performed in bringing the construction project to such a successful completion."

The 300,000-square-foot center features a football-field-sized room for the Q, two visualization theaters, five



Opening day at the Nicholas C. Metropolis Center

LeRoy N. Sanchez

collaboration laboratories, and more than 300 offices plus conference rooms and classrooms. All aspects of its design were aimed at providing the Lab with the latest in support of high-performance computing.

The Q computer is being built by Hewlett Packard; one-third of it has been installed and tested. When fully installed, the Q will be capable of 30 trillion floating-point operations per second, enabling the large-scale

computations needed to simulate weapon performance.

Over the center's two-year construction period, the project compiled an enviable safety record. Just a single workday was lost owing to injury out of 600,000 labor hours, and only two recordable injuries occurred, both back strains. More than 1,000 workers were involved in the center's construction. —Kevin N. Roark

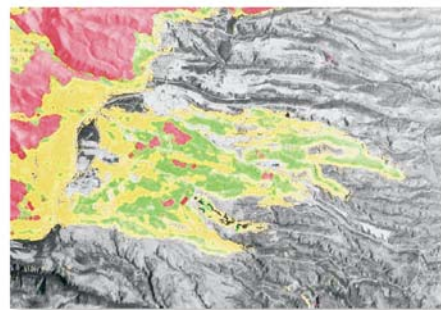
GENIE Wins R&D 100 Award

The Laboratory received an R&D 100 Award for GENIE, a versatile software tool for analyzing digital imagery. The R&D 100 Awards program is an international competition sponsored by *R&D Magazine* that honors the top 100 technological innovations of the year. Winning technologies exemplify the very best in cutting-edge scientific research and development.

GENIE (for Genetic Imagery Exploitation) evolves superior algorithms, or computer codes, for extracting features from images produced by remote-sensing instruments. It is particularly effective in detecting complex features that contain both spatial (shape) and color (wavelength) identifiers, such as wildfire burn scars in satellite images or cancer cells in medical images.

Beginning with a set of low-level image-processing algorithms (for example, edge detectors and spectral operators), GENIE tests each algorithm's ability to identify the feature of interest. The "less fit" algorithms are discarded and the "more fit" ones combined. After many generations of evolution, the resulting algorithm is highly optimized. By automating the algorithm-development process, GENIE will enable fuller analysis of the huge volumes of satellite and other remote-sensing images than is possible with current human and software image analysis.

GENIE was developed by a team of researchers from the Nonproliferation and International Security Division led by Nancy David. —Brian Fishbine



GENIE's map of the burn scar from the Cerro Grande wildfire in and around Los Alamos, showing regions of high (red), medium (green), and low (yellow) burn severity.